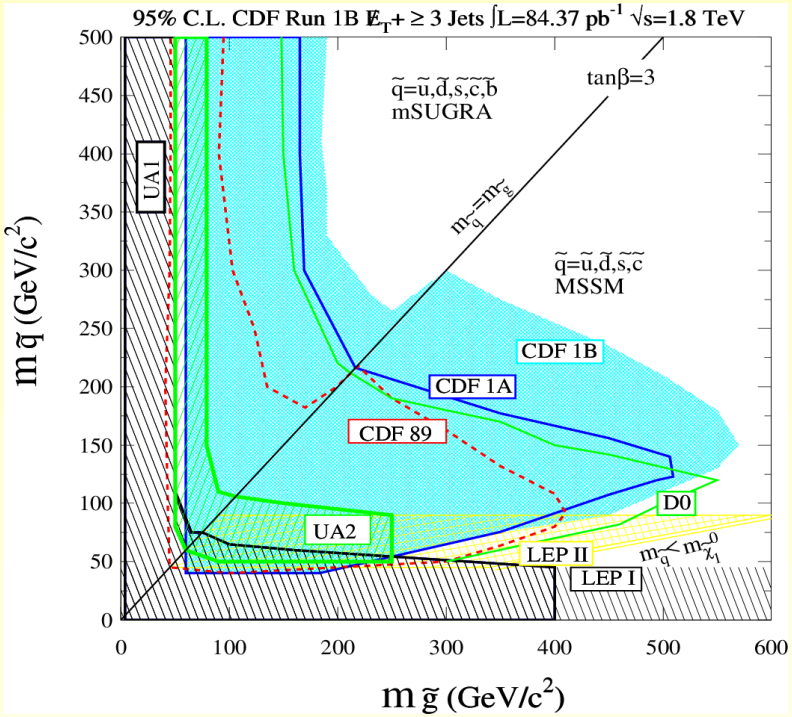
"Susy-Inspired" Models



- Phenomenology fixed by boundary conditions to RGEs at high scale
- Depends on β-functions
- (only "Active" sparticles contribute)

Approximate Solutions:

$$m_{\tilde{q}}^2 = m_0^2 + 6.3(5.8)M_{\frac{1}{2}}^2$$

$$M_{\tilde{g}} = 2.6M_{\frac{1}{2}} = 3M_{C_1} = 6M_{N_1}$$

$$M_{\tilde{g}}, m_{\tilde{q}} \to M_{\frac{1}{2}}, m_0$$

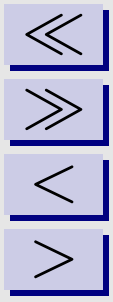
$$m_0 < 0 \Rightarrow m_{\tilde{\nu}} = 350 \text{ GeV}$$

Explores possibilities *beyond* mSUGRA

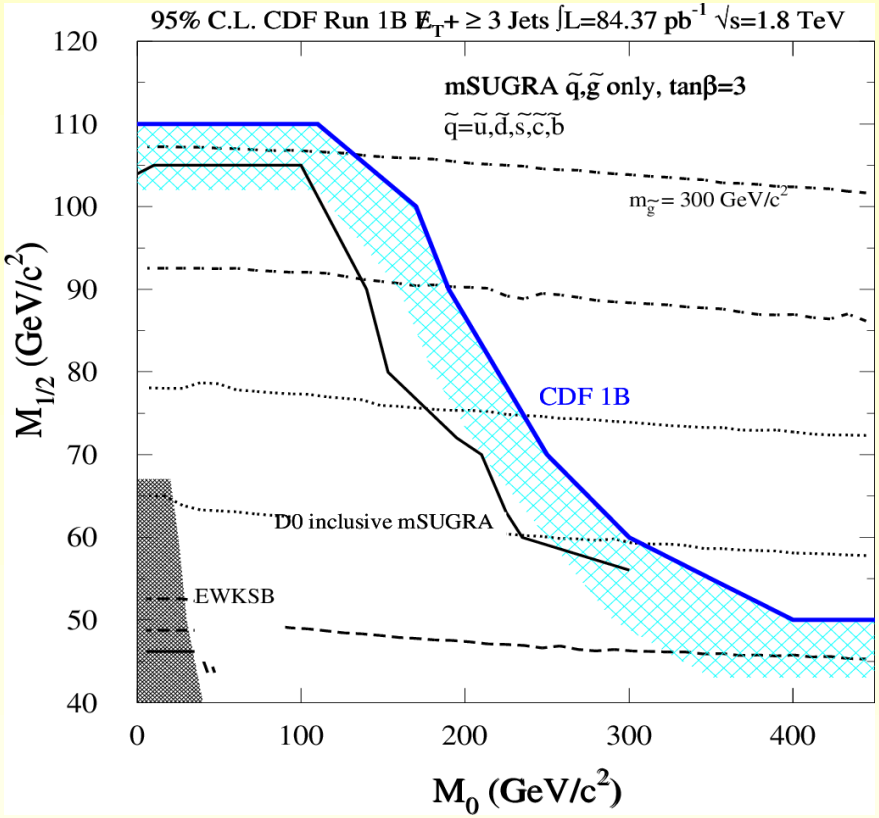
"Susy-Inspired" Models

- $m_{\tilde{t}_1} = m_{\tilde{t}_2} = \sqrt{m_{\tilde{q}}^2 + m_t^2}$
- $M_A, \tan\beta$, Stop determine Higgs sector
- $M_A \gg M_Z \Rightarrow$SM-like light Higgs

- Alternatively, ignore SM-like Higgs in "exact" mSUGRA
- But, typically, mSUGRA has $m_{\tilde{q}} > M_{\tilde{g}}$
- "Arbitrary" choice of slepton mass fixes leptonic BRs of C_1 (like-sign dileptons, *etc*)



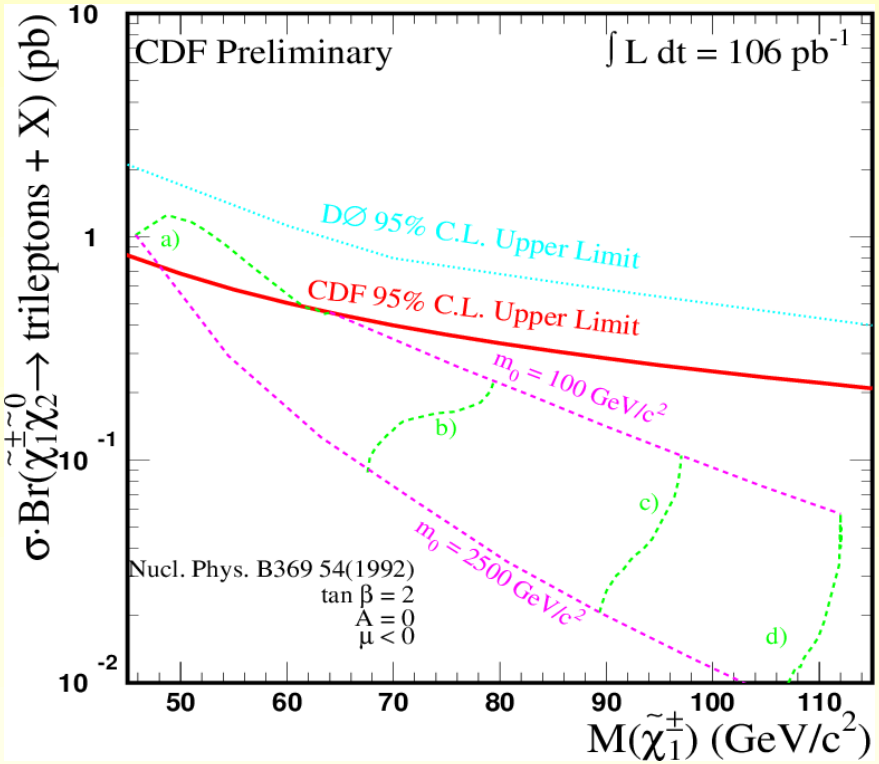
Same in mSugra Framework

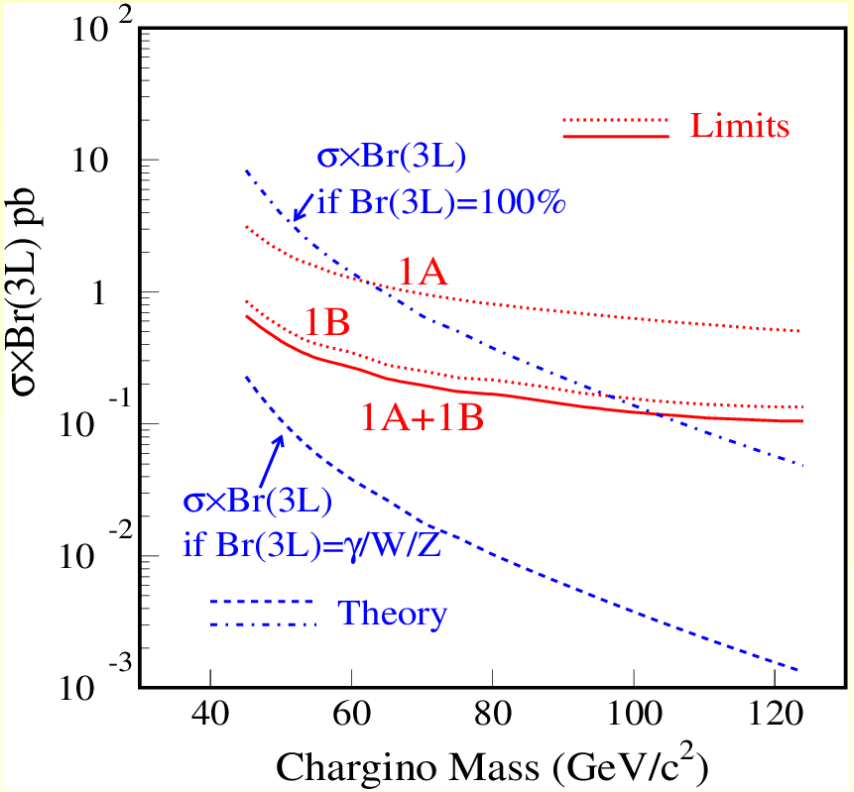


- $m_{H_1} = m_{H_2} = m_0$
- light Higgs boson highly correlated with other phenomenology

Specific Models	Low-Scale Parameter Sets
"Realistic"	Not a simple high-scale picture
Highly correlated	Recyclable
	Can point to analysis improvements

Trilepton Results





- Sensitivity to variation of parameters
- m_0 and $M_{\frac{1}{2}}$ contours

- Sensitivity to variation of BRs
- Not from a fully consistent model

Model/Parameter Dependence

- Production and Decay Rates fixed by mixings in $\widetilde{N}, \widetilde{C}$ sectors, squark/slepton masses

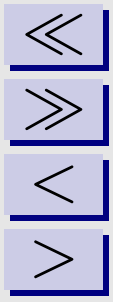
  In general, heavy objects produced with central rapidity

- Efficiency fixed by mass splitting $M_{\widetilde{C}_1} \simeq M_{\widetilde{N}_2} - M_{\widetilde{N}_1}$

  Decay distribution described by phase space, except near kinematic boundaries

Show dependence on

- $M_2 - M_1$
- Choice of decay distribution
- $\tan\beta$



Parameter Tree

High Scale Models

(boundary conditions

for RGEs at high scale)

Minimal SuperGravity Paradigm

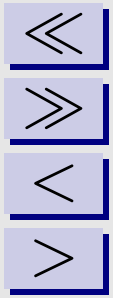
(a) $m_L = m_E = m_Q = m_U = m_D = m_H = m_0$

(b) $M_B = M_W = M_g = M_{\frac{1}{2}}$

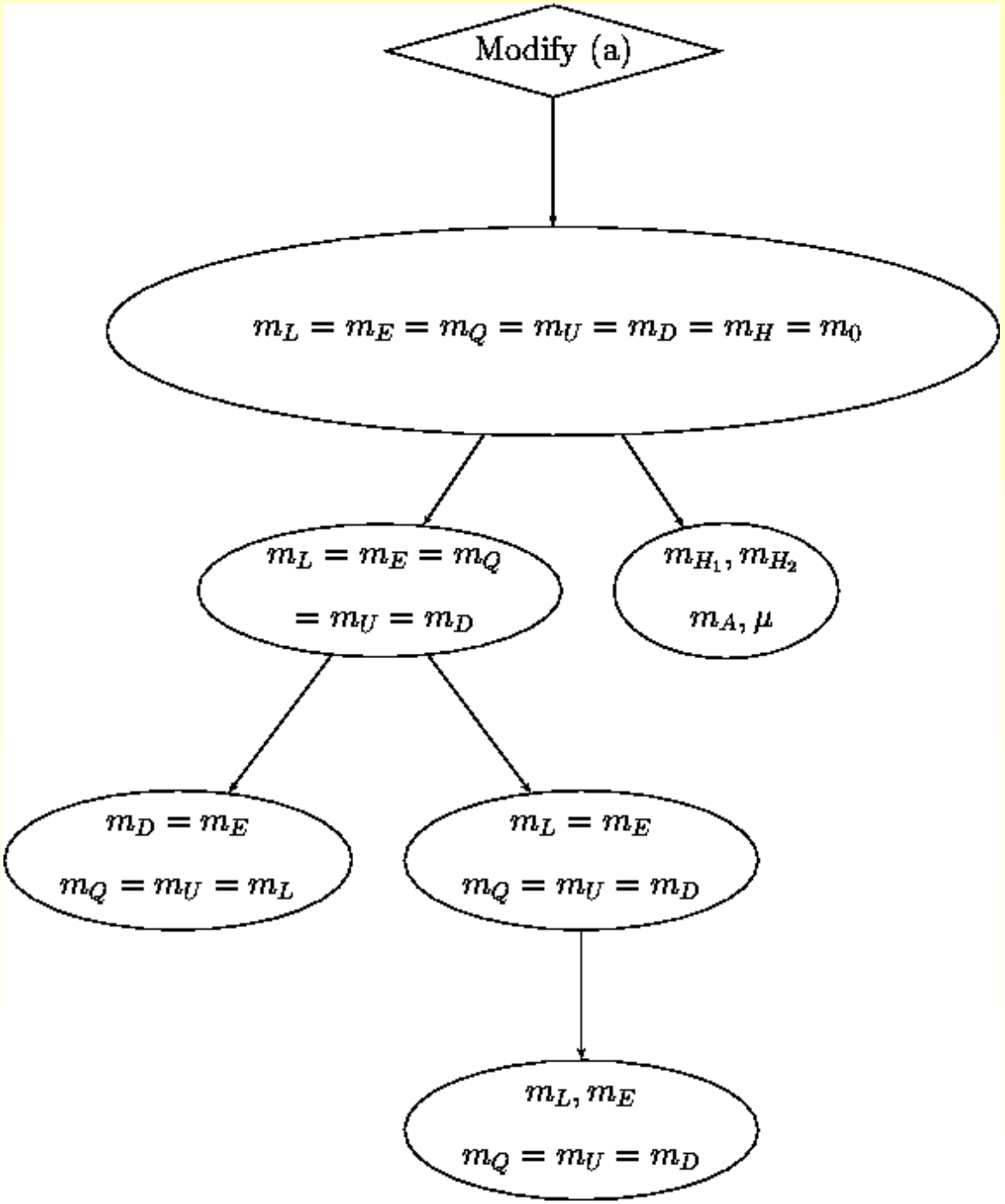
(c) $A_t = A_b = A_\tau = A_0$

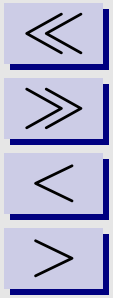
(d) $\tan\beta$

(e) $\mu \Leftrightarrow m_{H_1}, m_{H_2}, \tan\beta$



Parameter Tree





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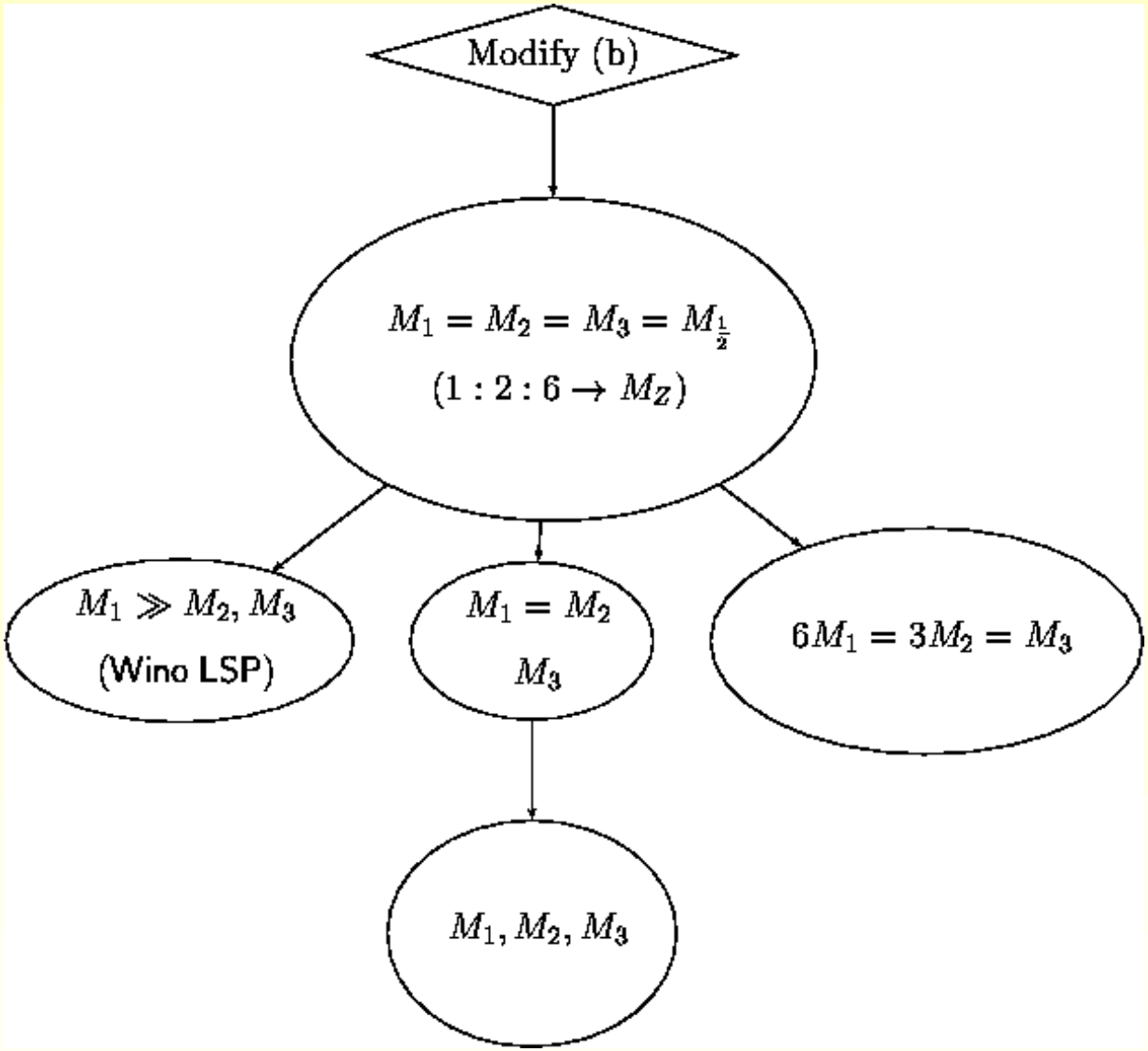

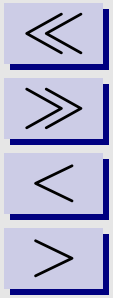

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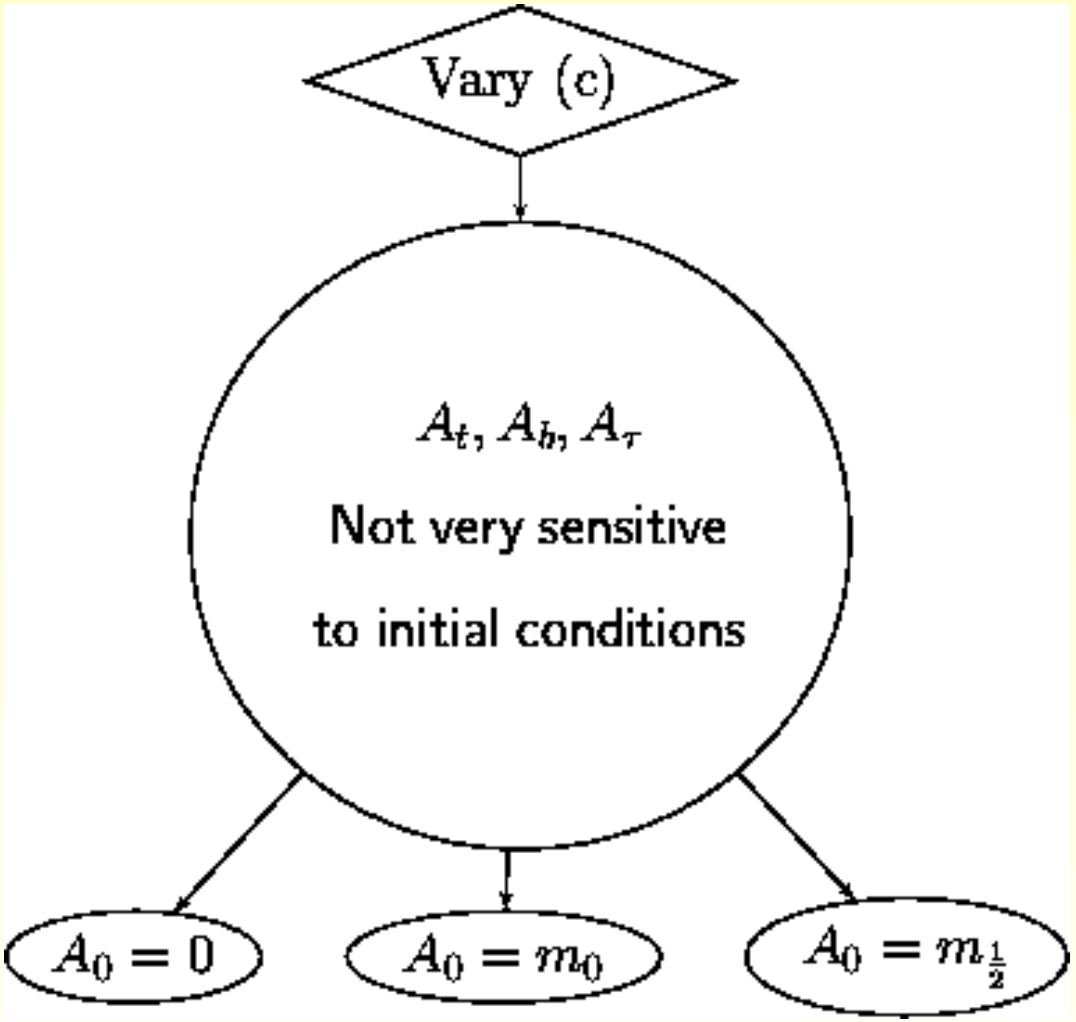

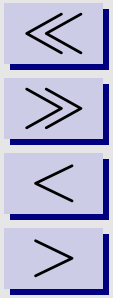

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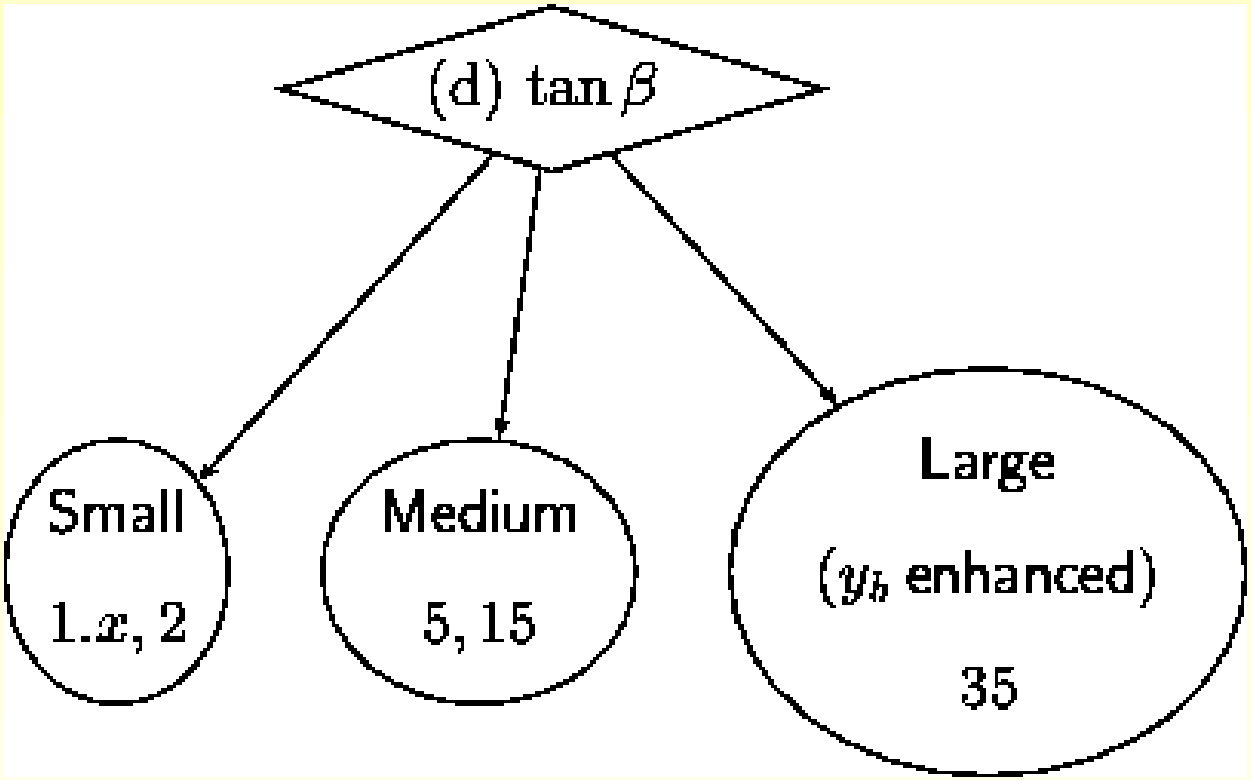
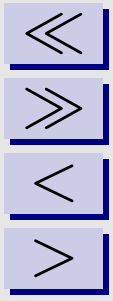
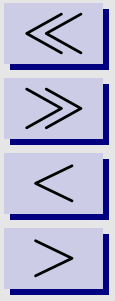




Caveats, other Considerations

- Fast Detector Simulations are needed when varying many parameters
- More powerful results from combining different search channels

  Requires a reliable description of the Standard Model
- Most powerful result:

  Introduce generic particles with generic couplings and look *everywhere*
- Susy results can be recycled into (e.g.) Technicolor ones
- Other possibilities (turning on some or all RPV couplings, extended Susy sectors)